Remarks

This paper is being provided in Response to the January 22, 2004 Office Action for the above-referenced application. In that Office Action, Claims 7-10 were objected to, and Claims 1-6 and 11-14 were rejected. Claims 7-10 were indicated to be allowable. Applicants have amended Claims 2 and 12, and canceled Claims 15-47 without prejudice to future continuation or division applications. Applicant respectfully submits that the amendments to the claims are supported by the originally filed application.

Objection under 37 C.F.R. 1.83(a)

A proposed drawing correction is submitted with this Response to show the "a plurality of spatially distinct, optically detectable, and phenotypic characteristics" in Claims 1-2 and 11-12, as required by Examiner. Applicant respectfully submits that the drawings are now in compliance and requests that this objection be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 1-2 and 11-12 are rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Examiner challenges the clarity of the phrase "a population of multicellular organisms comprising a plurality of spatially distinct, optically detectable, and phenotypic characteristics" in Claims 1 and 11, and the phrase "the spatially distinct, optically detectable, and phenotypic characteristics comprises a marker pattern comprising a plurality of spatially consistent first features spaced apart along a length of each organism and at least one second feature modifiable or inducible when the population is subject to a test treatment" in Claims 2 and 12.

Applicant respectfully submits that the phrases and words used in Claims 1 and 11 have their ordinary meanings and are clear on their face. The term "spatially distinct, optically detectable, and phenotypic characteristic" in Claims 1 and 11 refers to at least one character of the phenotype ("phenotypic characteristic") of at least one microorganism wherein that character of the phenotype is distinct in space ("spatially distinct") from any other character of the phenotype so as to be detectable using an optical measuring system ("optically detectable").

Consistent with this, the specification provides examples of spatially distinct, optical characteristics such as: the localized expression of DNA encoded fluorescent protein molecules, localized variations of the index of refraction or granularity, and localized variations in specific binding sites (receptors) for optically labeled antibodies, lectins, or other specific ligands. More specific features include the location of specific cells at particular developmental stages or the presence or absence of particular gene products at particular developmental stages, which can be marked by the presence or absence of a fluorescent protein molecule. See page 11, lines 30-31 and page 12, lines 1-6 of the present invention.

Similarly for Claims 2 and 12, the words in the phrase "the spatially distinct, optically detectable, and phenotypic characteristics comprises a marker pattern comprising a plurality of spatially consistent first features spaced apart along a length of each organism and at least one second feature modifiable or inducible when the population is subjected to a test treatment" have their ordinary meanings and are clear on their face. As stated above, at least one character of the phenotype ("phenotypic characteristic") of at least one microorganism wherein that character of the phenotype is distinct in space ("spatially distinct") from any other character of the phenotype so as to be detectable using an optical measuring system ("optically detectable"), has a marker pattern. The "marker pattern" is a collection of spatially, optically detectable, and phenotypic characteristics distributed at invariant locations along the length of the organism. See page 23, lines 15-22. The locations of these first features consistently spaced apart along the length of each organism creates a pattern and may serve as positional markers. See page 23, lines 17-18. The marker pattern also includes at least one second feature modifiable or inducible when the population is subjected to a test treatment. The at least one second feature whose position may be determined in relation to the marker pattern provides information, e.g. orientation of the organism or developmental stage information. See page 24, lines 6-9. Applicant respectfully submits that the phrases and words used in Claims 2 and 12 use their ordinary meanings and are clear on their face, and are fully supported and clearly explained within the specification.

Applicant therefore respectfully requests that the objections to Claims 1-2 and 11-12 be withdrawn.

Rejections under 35 U.S.C. § 102(b)

The rejection of Claims 1-6 and 11-14 under 35 U.S.C. § 102(b) as being anticipated by Ebersole et al. (U.S. Patent No. 5,578,460) is hereby traversed and reconsideration thereof is respectfully requested. Applicant respectfully submits that Claims 1-6 and 11-14 are patentable over Ebersole for the reasons set forth in detail below.

The present invention is an instrumentation system for the rapid analysis and sorting of *multicellular organisms* using *optical characteristics* such as light scatter and fluorescence to classify each organism in a flowing stream. The instrument system reports the intensity and the position of the fluorescence along the major (long) axis of the organisms. The present inventive system combines strains of multicellular organisms characterized by a stable special pattern of fluorescence, staining, or other optically detectable characteristics, with an instrument that can accurately sort multicellular organisms based on the position of an experimental feature relative to other invariant features by axial scanning. Specifically, Claim 1 recites a population of multicellular organisms with a plurality of spatially distinct, optically detectable, phenotypic characteristics and an instrument for detecting the location of the spatially distinct, optically detectable, phenotypic characteristics on the organism and for orienting the organism along its longitudinal axis.

Ebersole discloses an *electrophoretic* method for the isolation and separation of *single cell organisms*, such as bacteria and yeast. Specifically, Ebersole discloses the movement of suspended single cell organisms through a gel under the action of an electromotive force applied to electrodes in contact with the suspension, within a capillary electrophoresis tube. See, e.g., Column 1, lines 11-16; Column 5, lines 66-67 and Column 6, line 1 of Ebersole. Ebersole does not disclose an instrumentation system for the rapid analysis and sorting of *multicellular* organisms using *optically detectable* characteristics as is claimed by Applicants. Therefore, Applicants respectfully submit that the present claimed invention is not anticipated by Ebersole, and request that this rejection be withdrawn.

Rejections under 35 U.S.C. § 103(a)

The rejection of Claims 4-6 under 35 U.S.C. § 103(a) as being anticipated by Ebersole in view of Muller et al. (U.S. Patent No. 5,804,384) is hereby traversed and reconsideration thereof is respectfully requested. Applicant respectfully submits that Claims 4-6 are patentable over Ebersole in view of Muller for the reasons set forth in detail below.

Examiner states that "Ebersole et al. discloses the invention except for the instrument for measuring a gating signal of population of multicellular organisms over background signals." However, as stated above, Ebersole actually discloses an *electrophoretic* method for the isolation and separation of *single cell organisms*, such as bacterium and yeast. Specifically, Ebersole discloses the movement of suspended single cell organisms through a gel under the action of an electromotive force applied to electrodes in contact with the suspension, within a capillary electrophoresis tube. See, e.g., Column 1, lines 11-16; Column 5, lines 66-67 and Column 6, line 1 of Ebersole. Ebersole does not disclose an instrumentation system for the rapid analysis and sorting of *multicellular* organisms using *optically detectable* characteristics as is claimed by Applicants.

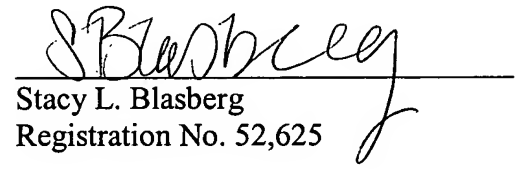
Examiner further states that Muller "teaches that it is known in the art to provide the instrument for measuring a gating signal of population of multicellular organisms over background signals." Applicant respectfully submits however, that Muller discloses a method and apparatus for isolating an analyte (e.g. a nucleic acid, a polypeptide, a carbohydrate, a lipid, a metabolite or a drug) from a sample. See Column 1, lines 53-56. Muller does not teach the isolation or analysis of *multicellular organisms*, as the Applicant claims. Therefore, Muller does not teach that it is known in the art to provide the instrument for measuring a gating signal of population of *multicellular organisms* over background signals.

Neither Ebersole nor Muller disclose, teach or suggest an instrumentation system for the rapid analysis and sorting of multicellular organisms using optically detectable characteristics. Applicants therefore respectfully request the rejection of Claims 4-6 be withdrawn.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4054.

Please charge any necessary fees or credit any overpayments to our Deposit Account No. 03-1721.

Respectfully submitted,



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